The College Board: Connecting Students to College Success

The College Board is a not-for-profit membership association whose mission is to connect students to college success and opportunity. Founded in 1900, the association is composed of more than 4,700 schools, colleges, universities, and other educational organizations. Each year, the College Board serves over three and a half million students and their parents, 23,000 high schools, and 3,500 colleges through major programs and services in college admissions, guidance, assessment, financial aid, enrollment, and teaching and learning. Among its best-known programs are the SAT®, the PSAT/NMSQT®, and the Advanced Placement Program® (AP®). The College Board is committed to the principles of excellence and equity, and that commitment is embodied in all of its programs, services, activities, and concerns.

Copyright © 2005 by College Board. All rights reserved. College Board, AP Central, APCD, Advanced Placement Program, AP, AP Vertical Teams, Pre-AP, SAT, and the acorn logo are registered trademarks of the College Entrance Examination Board. Admitted Class Evaluation Service, CollegeEd, Connect to college success, MyRoad, SAT Professional Development, SAT Readiness Program, and Setting the Cornerstones are trademarks owned by the College Entrance Examination Board. PSAT/NMSQT is a registered trademark of the College Entrance Examination Board and National Merit Scholarship Corporation. Other products and services may be trademarks of their respective owners. Permission to use copyrighted College Board materials may be requested online at: http://www.collegeboard.com/inquiry/cbpermit.html.

Visit the College Board on the Web: www.collegeboard.com.
AP Central is the official online home for the AP Program and Pre-AP: apcentral.collegeboard.com.
Write in the box the number of the question you are answering on this page as it is designated in the examination.

(c1) Price

(i) Produces OQ

price is P

(ii) Area of economic

profits

(b1) A firm hires up to the point where marginal factor cost (MFC) = marginal revenue product (MRP) for profit-maximizing amount of labor.

(ii) Wage rate ($/hr)

Profit maximizing

s = MFC

Quantity of labour

$25

s' is Q where

MRP = MFC

(c) (i) Supply curve shifts from S to S'

(ii) PetcoAll would hire OQ'
(a) (i) Total fixed costs remain unchanged since wages are variable costs.

(ii) Marginal cost falls since Petsall is paying less ($15/hr) for each additional worker.

(iii) At lower input costs, Petsall will supply more, shifting the supply curve of the product to the right and therefore the price of the product falls.

\[ \text{Product} \quad \text{Price} \]

\[ P_x \quad P_y \]

\[ D \quad S_{1} \quad S_{2} \]

Copyright © 2005 by College Board. All rights reserved.
Visit apcentral.collegeboard.com (for AP professionals) and www.collegeboard.com/apstudents (for students and parents).
Write in the box the number of the question you are answering on this page as it is designated in the examination.

\[ \text{Price} \]

\[ P_0 \]

\[ \text{MC} \quad \text{ATC} \]

\[ \text{MR} \quad \text{Demand} \quad \text{Quantity} \]

\[ Q_{\text{Max}} \]

\[ \text{Price} \]

\[ P \]

\[ \text{MC} \quad \text{ATC} \]

\[ \text{MR} \quad \text{Demand} \]

\[ Q_{\text{Max}} \quad \text{Quantity} \]

\[ \text{the area of economic profit} \]
Write in the box the number of the question you are answering on this page as it is designated in the examination.

(i) \(\text{MRP} = \text{MFC}\).

(ii) [Diagram of supply and demand curves with equilibrium price and quantity labeled.]
Write in the box the number of the question you are answering on this page as it is designated in the examination.

(i) As illustrated on the graph, the supply of labor to Petsahl will decrease from $C_{\text{max}}$ to $C_1$.

(ii) As illustrated on the graph, the amount of labor Petsahl would hire will increase from $C_{\text{max}}$ to $C_2$. 
Write in the box the number of the question you are answering on this page as it is designated in the examination.

(i) Total fixed cost would remain constant.

(ii) Marginal cost would decrease.

(iii) Price of the product would decrease.
Write in the box the number of the question you are answering on this page as it is designated in the examination.

(i) marked on graph
(ii) shaded in graph
The line from the vertical line created from the intersection of MC and MC. This line hits ATC then 0 showing economic profit.
(b) since profit maximization occurs where MR = MC. Since MR is 20 per worker / per hour, MC needs to be 20 as well.

(i) labor supply and demand graph

(ii) since the price level has decreased there will be an increase in labor demand and also in minimum wage.

(iii) the amount of labor hired would increase at lower wage rate.
Write in the box the number of the question you are answering on this page as it is designated in the examination.

(d) lower wage rates

Wage rate does not affect total fixed cost.

(ii) Marginal cost decreases as the corporation will cut pay employees.

(iii) The price of product will decrease because the inputs used to create the item have decreased.
2. (a) Curve 1: Marginal Cost Curve (MC)
   Curve 2: Average Total Cost Curve (ATC)
   Curve 3: Average Variable Cost Curve (AVC)

(b) Curve 1, which is the marginal cost curve, reflects marginal product as quantity increases. Initially, marginal product increases due to the specialization effect. Thus, marginal cost decreases at first. However, as the quantity increases, marginal cost increases due to the diminishing marginal product law.

(c) Curve 2 - Curve 3
   = ATC - AVC = AFC
   : Average Fixed Cost (AFC).

(d) Fixed cost is constant throughout the production process. Therefore, as the quantity of output increases, the average fixed cost is spread over and decreases. Thus, the gap between curve 2 and curve 3 decreases as output increases.

(e) Short-run supply: A curve; MC above AVC.
Write in the box the number of the question you are answering on this page as it is designated in the examination.

(a)

(i) Curve 1 is Marginal Cost (MC)
(ii) Curve 2 is Average Total Cost (ATC)
(iii) Curve 3 is Average Variable Cost (AVC)

(b)

(i) Initially decreases.
- Curve 1 is the marginal cost curve. It initially decreases before the point J because when the firm hires some workers, at first, they can specialize in the work and produce more.

(ii) Finally increases.
- However, in the short run, the firm cannot make the factory bigger in a night. Therefore, because they should share the equipments and the factory is crowded, marginal product diminishes and hence, the curve finally Marginal Cost rises.
2. Write in the box the number of the question you are answering on this page as it is designated in the examination.

(a) The vertical distance between curve 2 and curve 3 is average fixed cost. Because the curve 2 is the average total cost curve and the curve 3 is the average variable cost. Average total cost (ATC) is the sum of AVC and AFC.

(d) As output increases, it means the quantity increases. Average fixed cost appears when the fixed cost is divided by the quantity of output. Therefore, as output increases, the vertical distance decreases.

(e) R, S
Write in the box the number of the question you are answering on this page as it is designated in the examination.

(a) (i) Curve 1 is the Marginal Cost Curve
(ii) Curve 2 is the Average Total Costs Curve
(iii) Curve 3 is the Average Variable Costs curve

(b) (i) When a business first gets started, it costs less for every new unit made because they are very small at the time. Every additional unit of output initially costs less than the one before it.

(ii) As the business continues, eventually output will start to cost more for every additional piece of output. It increases because every additional piece of output costs more than the one before it.

c) Between curve 2 and curve 3, Average Fixed Costs is represented. AFC + AVC = ATC

d) When the business begins, it only has fixed costs which account for the majority of total costs. As the business grows, fixed costs stay the same while AVC increases. Average variable costs become the majority of the business costs as it gets larger causing fixed costs to be a very small part of the ATC. This is why the gap gets smaller as output increases.

e) K and L are the points on this firm's short run supply curve because the MC curve above NR is the supply curve.
Write in the box the number of the question you are answering on this page as it is designated in the examination.

Because government's subsidize on the production of wheat reduces the cost of producing wheat, wheat's supply increases. Therefore, supply curve of wheat shift to right as $S_1$ shift to $S_2$ in above the graph. Finally, equilibrium price decreases and equilibrium quantity increases.

The bread market shows same effect as problem i). Because wheat is bread's ingredients, suppliers will increase the supply if cost of wheat decreases.
We can see that wheat's price decreases in graph of problem i). Therefore, supply curve of bread shifts right and equilibrium price decreases, equilibrium quantity increases.

Because the price of bread decreases in problem ii), According to the law of demand, demand increases when price decreases, so bread's demand increases. Also, bread and butter are complementary goods. So when bread's demand increases, butter's demand increases also. Therefore, butter's demand curve shifts to right as D₁ shifts to D₂ in graph above. Finally, equilibrium price increases and equilibrium quantity increases.
Bread’s price decreases as we can know from problem (ii) in (a).

The demand curve above is price elastic. As we can see, when price decreases, price decreases very little but quantity increases for very large amount.

Because total revenue is price x quantity, initial total revenue of bread is area \( P_1AQ_1B \), and total revenue after subsidy is area \( P_2AQ_2C \).

Because price increase of quantity is much bigger than decrease of price, total revenues for the bread producers increases after government subsidy.
Write in the box the number of the question you are answering on this page as it is designated in the examination.

(a) 

(i) 

(ii) 

- Because the government subsidizes wheat production, there will be more wheat to produce bread, therefore, bread production will increase too.

(iii) 

- Because bread and butter are complementary goods, the rightward shift of the supply will cause the supply of butter to shift rightward.

(d) Total revenues for the bread producer will increase as a result of the government subsidy, which causes production to increase.
Write in the box the number of the question you are answering on this page as it is designated in the examination.

(i)

THE WHEAT MARKET

The government subsidies help the wheat market to supply more wheat, \( S \uparrow \rightarrow P_1, Q_1 \uparrow \).

(ii)

THE BREAD MARKET

Since wheat and bread are supplementary goods, the increase in wheat supply increases the supply of bread as well. \( S \uparrow \rightarrow P_1, Q_1 \uparrow \).
Since butter and bread are complementary goods, the increase in supply of bread decreases the supply of butter. \( S \downarrow \Rightarrow P_T, Q_T. \)
b) Bread = price elastic

The gov. subsidy ⇒ S(wheat) ↑ ⇒ S(bread) ↑ ("supplementary good") ⇒ for wheat mkt

⇒ P(bread) ↓ ⇒ And, because it's price elastic, as P ↓ ⇒ Q ↑ ⇒ Q ↑.

(As supply of wheat ↑),

Supply of bread ↑.

Price falls.

Increased output of bread.